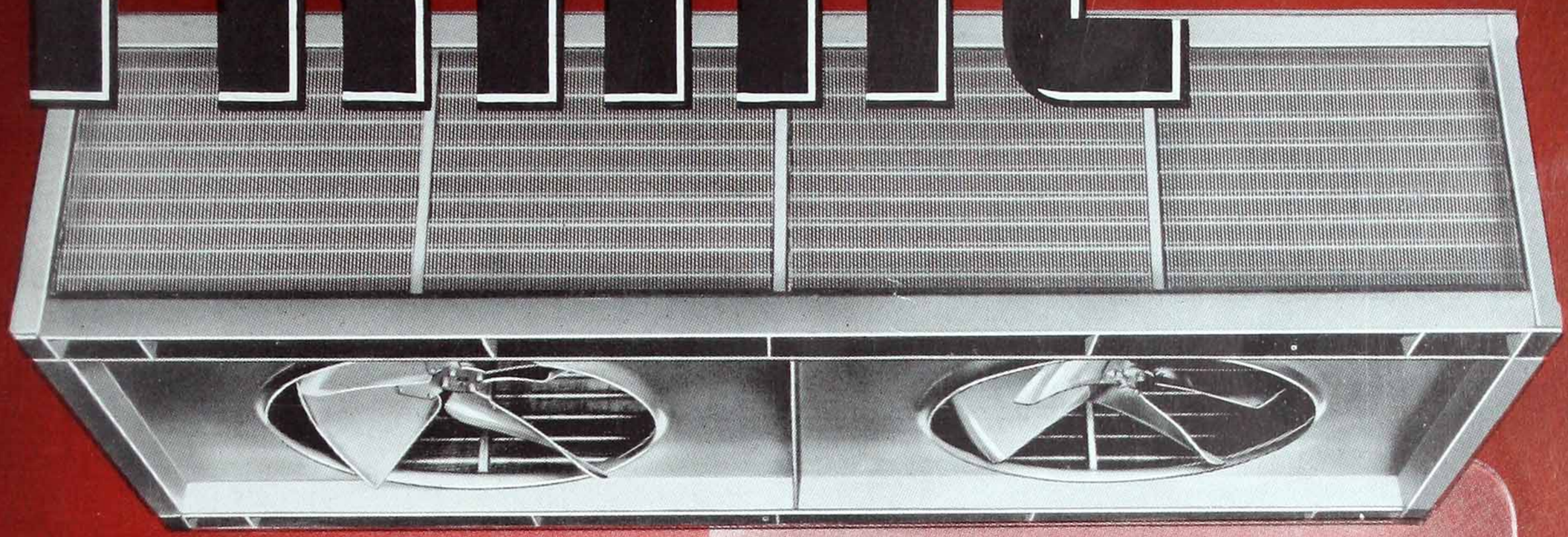
AIR

TRANE



MULTIPLE *Projection* HEATER

An Advanced Unit Heater Design Combining the Long Range Delivery and High Capacity of the Blower Type Unit Heaters with the Light Weight and Moderate Cost of the Propeller Type Unit.

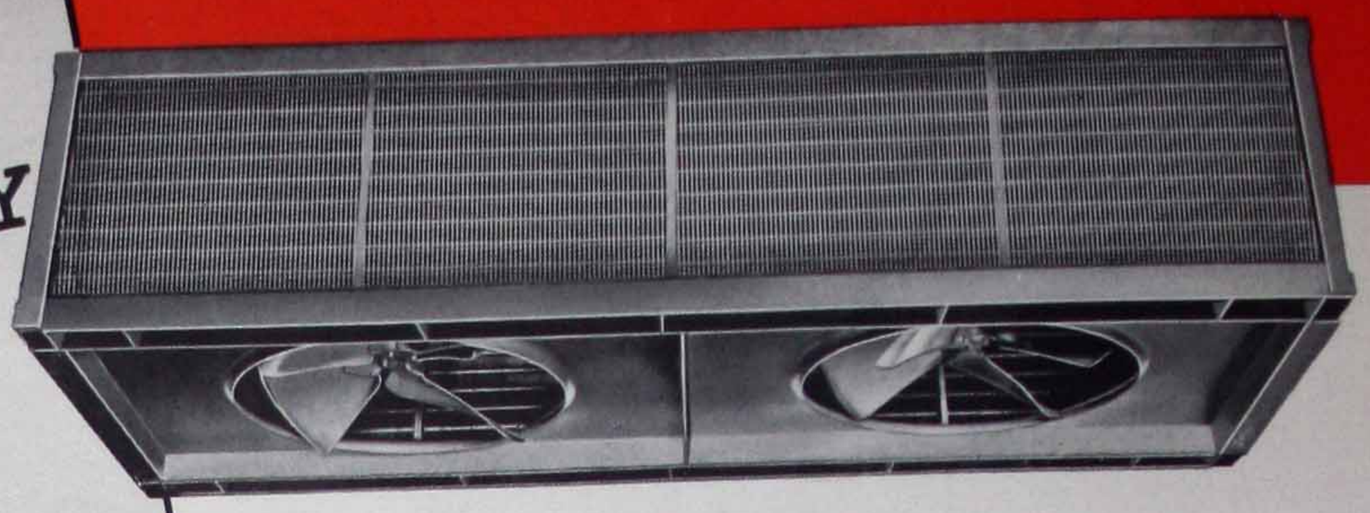
• BULLETIN NO. 294

For FACTORIES • LARGE OFFICES • HALLS • CORRIDORS • OR WHEREVER A MAXIMUM OF SPACE MUST BE HEATED WITH A MINIMUM OF UNITS.

OCTOBER - - - - - - 1937

New HEATING EFFICIENCY and ECONOMY WITH THE TRANE MULTIPLE *Projection* HEATER

Blower Type Unit Heater Features at a Fraction of the Cost and a Fraction of the Weight.



The 2-fan Multiple Projection Heater. Note the sturdy Trane Extended Surface Coil. There is another one just like it at the back. Note that there is nothing in front of the fans to impede air flow or cause operating noise.

THE new Trane Multiple Projection Heater combines the lightness, flexibility, and moderate price of the propeller type unit heater with the long-range delivery and large capacity of the heavier, more costly blower type unit heater.

For heating large spaces with steam or hot water it has definite advantages over all other types of equipment.

It is a multiple fan unit, with each fan under individual control — doubling the flexibility of the heating system.

In volume of air delivered and heat produced it is the equivalent of a blower type unit of approximately twice its weight. It is easy to handle and does not place undue stress on girders or beams.

It delivers a large volume of air at moderate temperature rather than a limited volume at high temperature, thus promoting good circulation and eliminating drafts.

New Design — New Economy

The Trane Multiple Projection Heater is entirely new in principle, design, and performance. It is the fruit of Trane's fifty years of heating experience.

It ***drops*** heat down from the ceiling to the floor zone. Under certain conditions, it actually delivers warm air to the floor ***when steam is turned off.***

It is in a class by itself on power saving. Two standard ½ horsepower motors accomplish results that require 2 or even 3 horsepower on a blower type unit of comparable capacity.

Due to the individual motor control, added savings are made in power and steam during moderate weather. Overheating is thus guarded against, and overheating is as uncomfortable as underheating — and a lot more expensive.

With an ordinary pipe coil or radiator heating installation there may be as much as 40° temperature difference between floor and ceiling. With floor type unit heaters or unit heaters that can be mounted only 12′ or 14′ above the floor, there may be as much as 20° to 25° temperature difference. But with the new Trane Multiple Projection Heater mounted at the ceiling, feeding on the warm ceiling air, this temperature difference may drop to as low as 10° — in some cases lower. The possible fuel saving is enormous.

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New Installation Advantages

The principle of air discharge to the floor zone with both the single-fan and multiple-fan projection heater is essentially the same. The illustrations at the right picture the single-fan unit.

Its mounting height is practically unlimited; units as high as 30′ give perfect distribution at the floor. The Heater clears all machinery, travelling cranes, and other aerial equipment.

The unit is comparatively quiet. Although light and easy to handle, it is built for permanence. Weight has been saved by eliminating superfluous parts and metal, not by skimping on essentials.

Although designed for high (initial) velocity, the living zone velocity is low. This is due to the long throw from the ceiling to the floor. All floor space may be used, even directly below the unit.

A single Trane Multiple Projection Heater mounted at the ceiling in the center of a factory or other large space will take care of a huge floor area. In many cases, only one unit is required.

For smaller spaces, or where building contours make a series of smaller units advisable, there is a single fan Trane Projection Heater. The single fan unit has all the features of the Multiple Projector. It is described and illustrated in a separate Trane bulletin.

Quality-Built Throughout

Although the Trane Projection Heaters, both single and multiple types, are new in design and features, the parts from which they are built are perfectly standard and time tested.

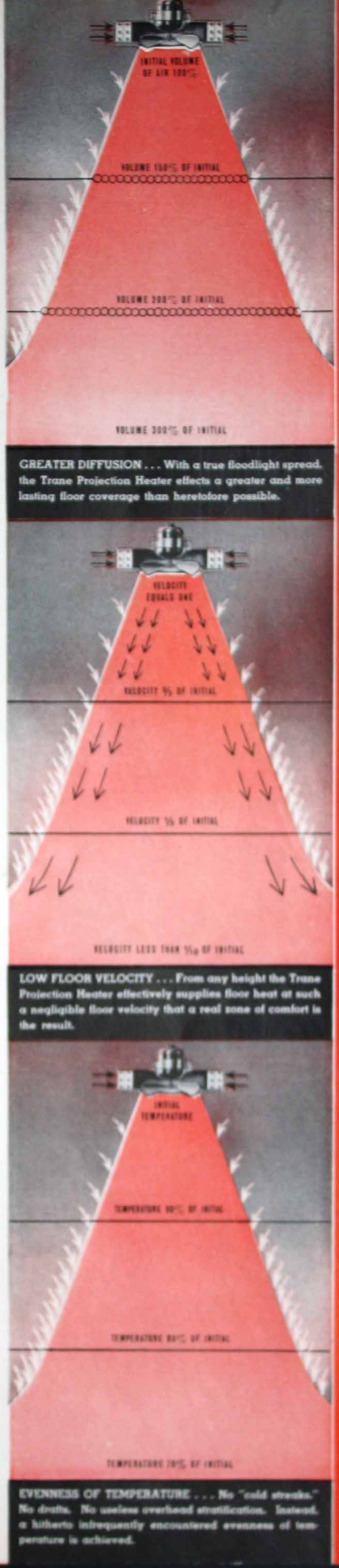
The Trane extended surface coil is the heart of the unit. Tens of thousands of these coils are in service throughout the world, for both heating and air conditioning applications. Made of non-ferrous metal, solderless, the coil lasts indefinitely, on high pressure work as well as low pressure.

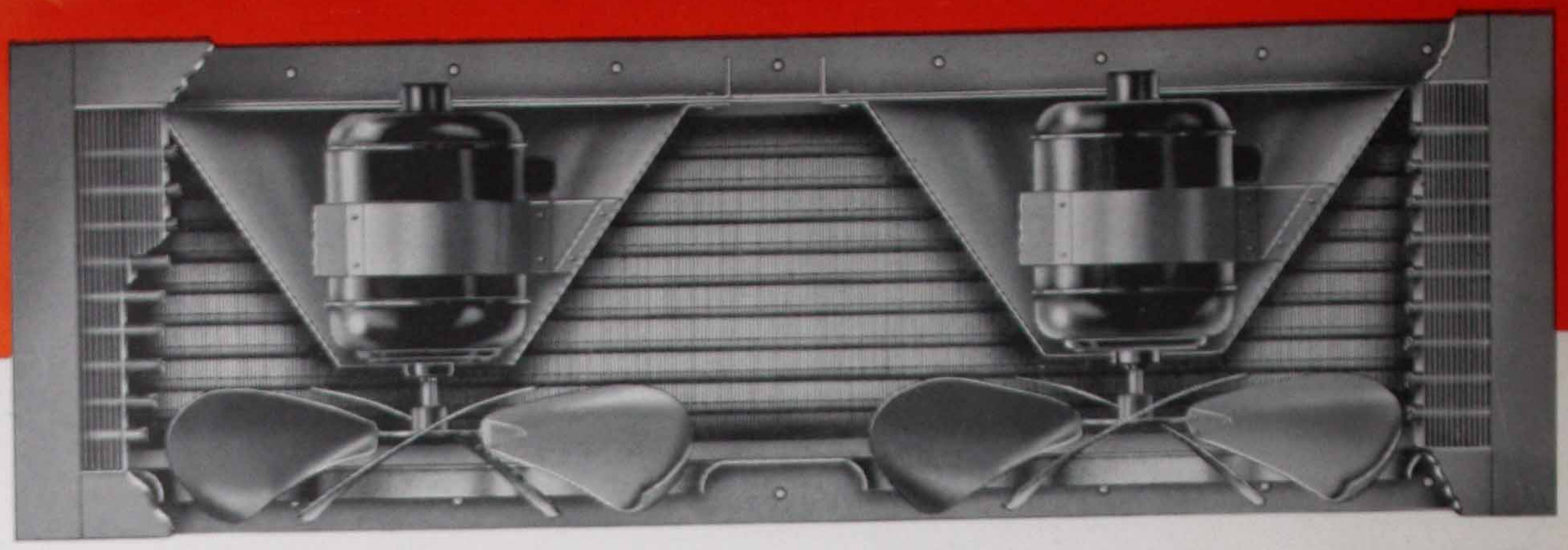
Fans are built by Trane especially for unit heater service. Motors are the product of nationally known manufacturers. Casings, bearings, and auxiliary items are carefully selected for permanent performance.

Trane Projection Heaters are the last word in space heating equipment. Retaining all the ordinary features of both blower type and propeller type unit heaters, they possess added advantages that make possible new installation and operating economies, as well as new comfort.

Exclusive Features

1. Powerful Trane fans make high ceiling mounting practical — cuts costs by reducing ceiling temperatures 10° to 25°.
2. Projects cone of warmed air straight down to floor — warm floors mean true heating comfort.
3. Individual fan control possible — exactly the amount of heat needed; eliminates overheating in mild weather.
4. Under normal operating conditions, unit projects warm ceiling air to floor for lengthy periods with steam supply turned off — saves fuel.
5. Unit has Blower Type Heater features, without Blower Type weight and cost.
6. Uses famous Trane Extended Surface Coils — permanent satisfaction, whether steam pressure is low or high.
7. Delivers large volume of air at moderate temperature, to eliminate drafts and improve air circulation.
8. Saves all floor space — even the area directly below the unit may be used for production purposes.
9. Requires only one-half or less of the motor horsepower of a Blower Type Unit Heater of comparable capacity — more economy.
10. Projects air down in a cone that diffuses in all directions simultaneously — even heat distribution everywhere.
11. Motor is out of the path of the air stream.





Cut-Away Illustration Showing Simple Internal Construction of Multiple Projection Heater.

THE INSIDE STORY *of the* MULTIPLE PROJECTION HEATER

THE cut-away illustration shows at a glance the unique space- and money-saving design of the Trane Multiple Projection Heater.

Note how construction has been simplified. By using two Trane Extended Surface Coils as side sections, with the durable metal enclosure that carries the fans and motors, the entire unit is made lightweight and compact.

No heavy shafts, bearing supports, or massive frame-work required. The saving in weight means a saving in cost that is passed along to the purchaser. Yet every desirable unit heater feature has been retained — and many new and exclusive features added.

Operation

The Trane 4-blade fans draw ceiling air through the coils, and project it straight down to the floor, in an inverted cone of comfort. Nothing could be simpler. Nothing more positive in results.

Due to the draw-through principle employed, air leaves the fans at an even temperature, thus promoting smooth delivery. There are no obstructions ahead of or behind the fans to limit their capacity.

If unit is to be used as part of a ventilating system, short runs of fresh air ducts may be attached to either or both coils.

Multiple units are available with either 2 or 3 fans, each individually controlled. One or all may be in operation, depending upon weather conditions and heating requirements.

Simple angle-iron arrangement provides flexible mounting for ceiling installation. Units also available for wall or floor installation where ceiling mounting is impractical.

Coils

The cut-away illustration, as well as the view below, show the sturdy construction of Trane Extended Surface Coils. A series of round tubes have fin surface attached to them by the patented Trane process that makes the fin in effect an integral part of the tube. Tubes are rolled into close grained cast iron headers in boiler-tube style.

These coils stand both high and low pressures. The non-ferrous surface is rustproof. Smooth fins are self-cleaning, and are particularly advantageous where lint or other particles are found in the air.

Fans and Motors

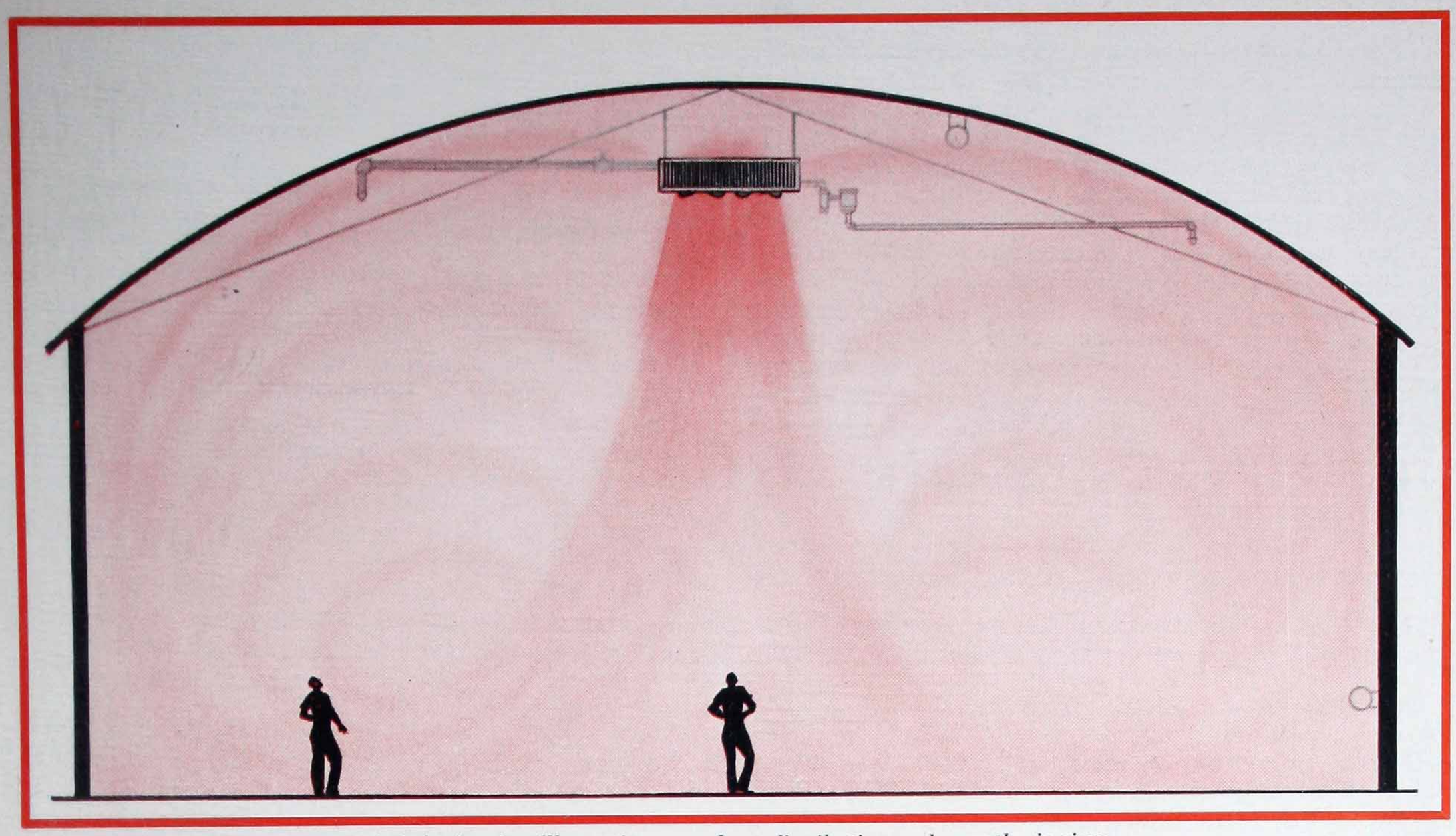
The Trane 4-blade fan was designed in the Trane laboratories especially for unit heater service. Its slow air acceleration characteristics make it quiet in operation. Its scientific blade shape enables it to deliver air at high velocity with a minimum of motor horsepower at lowest noise level.

Motors are the product of nationally known manufacturers. They operate perfectly in the vertical position, having a built-in thrust bearing to compensate for any up-and-down movement. Under normal conditions, once-a-year oiling is sufficient.

Note in the cut-away illustration that the motors have a three-point resilient shock-absorbing mounting. Also that they are entirely out of the heated air stream, whether the unit is idle or in operation.

LEFT: The Trane 4-Blade Fan that delivers air at high velocity with a minimum of motor horsepower.

BELOW: The sturdy Trane Extended Surface Coil used on Multiple Projectors has been standard for years for air conditioning applications and all types of heating applications. Stands high pressures as well as low pressures, permanently.



Artist's drawing illustrating even heat distribution and smooth air circulation produced by Trane Multiple Projection Heater mounted at ceiling.

THE IDEAL UNIT *for* HEATING LARGE SPACES

HERE is the Trane Multiple Projection Heater at work. The smooth tint represents the even temperature distribution. The tint also indicates the path of the recirculating air, constantly in motion and constantly being diffused with the warm air supply.

Only at the outlet of the unit, far above the comfort zone, is the delivered air appreciably above normal temperature. This is indicated by the deeper tone.

Note how the air is projected in a vertical line to the floor zone with this high velocity unit. It has no tendency to turn and skid toward the ceiling.

Mounting height is practically unlimited. Units as high as 30′ from the floor function perfectly.

Both 2-fan and 3-fan units are available. One unit, with its simple supply and return line, takes care of a huge space.

Ceiling mounting is made safe and simple by the light weight of the unit. Piping is reduced to a minimum. The unit occupies space that is useless for other purposes. Floor space, always at a premium, is not required. Even the area directly below the unit may be used for regular production purposes.

Efficient Air Circulation

There are definite advantages to the user of a unit that is designed to permit air to be dropped in a vertical line from the ceiling to the floor. Air delivered in this manner continues to go down as long as it has any velocity at all. This makes possible the floor-line delivery of low velocity air. While high velocity is essential for long-range delivery, low velocity is of equal importance after the air reaches the working zone.

Note that air from the Multiple Projection Heater is delivered in a cone — not in the customary narrow band of heat. It diffuses equally in all directions. No cold spots. No drafty spots.

With the unit in a central location, all walls may be blanketed simultaneously. Drafts are stopped at their source.

Warm air delivered and kept in the floor zone protects the feet of workers and increases efficiency.

The cone of air delivered by the unit increases in volume 300% by the time it reaches the floor zone. The circulation movement indicated in the illustration shows how this induction keeps all the air in constant, gentle motion.

Even Temperature

The evenness of temperature indicated by the smooth tint of the illustration is made possible by design features of the Multiple Projection Heater.

It is a draw-through unit. The fan draws air through the coil instead of blowing it through the coil. Air leaves the fans at even temperature.

The air is delivered at a moderate temperature. Large heating capacity is secured by delivering large quantities of air. This is essential for even heat distribution. While a unit delivering a comparatively small quantity of high temperature air may carry the same rating as far as B.t.u. capacity is concerned, such a

unit is expensive to operate and unsatisfactory in performance. Low velocity, high temperature air races to the ceiling, where it stratifies and serves no useful purpose. It causes drafts, spotty heating, and wastes floor space due to its high temperature. The ideal heating unit must deliver a large volume of air at a moderate temperature.

Even temperatures are secured with the Trane Multiple Projection Heater under all weather conditions. Individual fan control and Trane coil construction help make this possible. In moderate weather, with a 3-fan unit, only two of the fans need be in operation. In mild weather one fan may be sufficient. In abnormally cold weather extra capacity is easily secured by increasing boiler pressure. Trane coils stand high pressures even though purchased for normal low pressure service.

Importance of High Initial Velocity

Air must be delivered from the unit at a high initial velocity if it is to have carrying power. High velocity delivery makes ceiling mounting of Multiple Projection Heaters practical.

Ceiling mounting makes possible the vertical discharge, the even temperature, and the operating economies of the unit.

The ceiling is the loafing place of stratified warm air. The Multiple Projection Heater feeds on this air, forcing it back into service. Steam supply may be turned off and fans kept in operation over considerable periods of time. The units continue to deliver warm air to the floor. True economy.

The high velocity discharge causes a large amount of room air to be induced into the heated air stream. This causes the gentle air circulation characteristic of the unit, and lowers the temperature of the main air stream to the comfort point before it reaches the living zone. While the air volume is being increased 300% by the induced air, the air temperature is being reduced to the comfort point.

Thus with the Trane Multiple Projection Heater one design feature supplements another, resulting in a unit that is truly ideal for large space heating.

TRANE TEMPERATURE EQUALIZING SYSTEM

(PATENTS APPLIED FOR)

The natural tendency for warm air to rise and stratify near the ceiling has been the core of all heating problems, and reducing this excessive ceiling temperature has been the major objective of all modern heating systems.

Patents have been applied for by The Trane Company on a new method of space heating that accomplishes this coveted result.

The system is designed not only to reduce the temperature of the warm ceiling air, but also to utilize this warm air for floor heating purposes.

It is designed to automatically equalize floor and ceiling temperatures. It embodies the most recent advancements in heating economy and heating comfort.

It makes possible a full utilization of the exclusive features of Trane Projection Heaters, both single and multiple fan models.

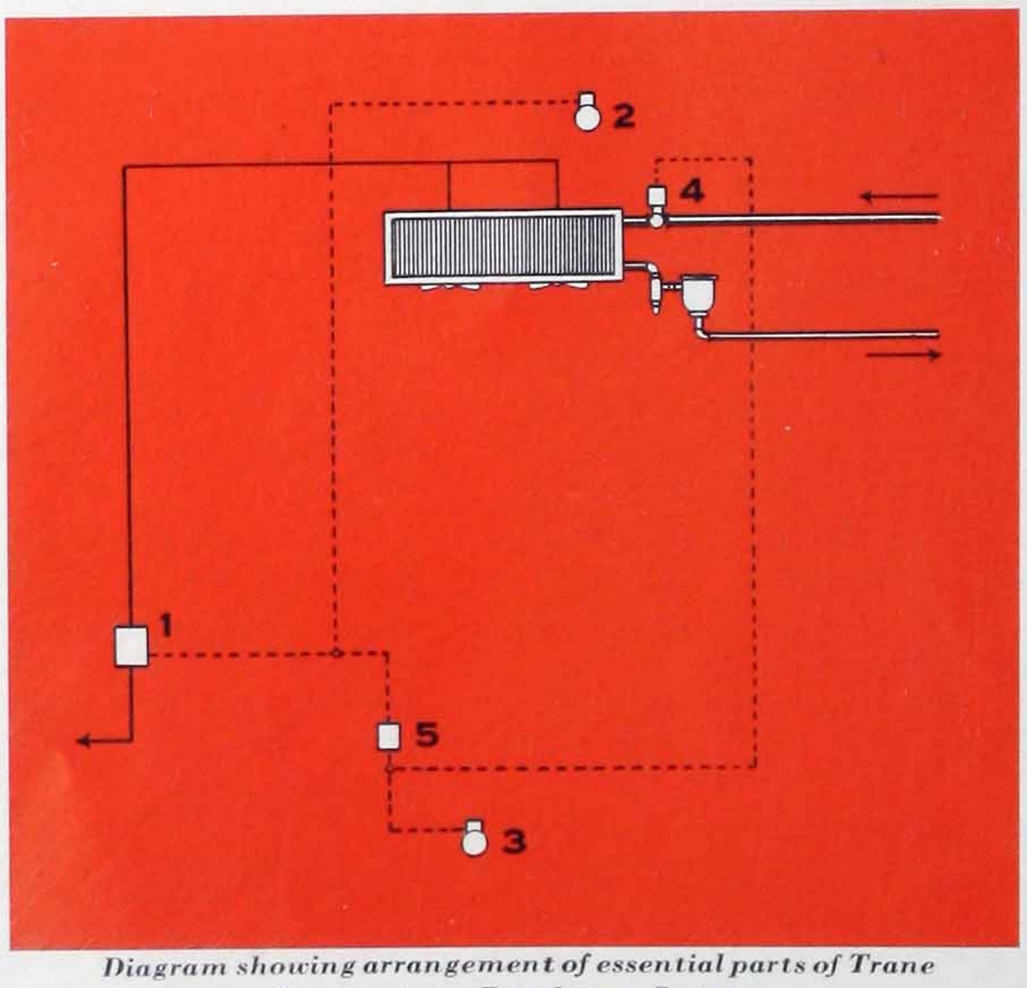


Diagram showing arrangement of essential parts of Trane Temperature Equalizing System.

How It Operates

The diagram shows the general arrangement of essential parts. A magnetic switch (1) is connected to a ceiling thermostat (2), a floor zone thermostat (3), and an electrically operated steam valve (4).

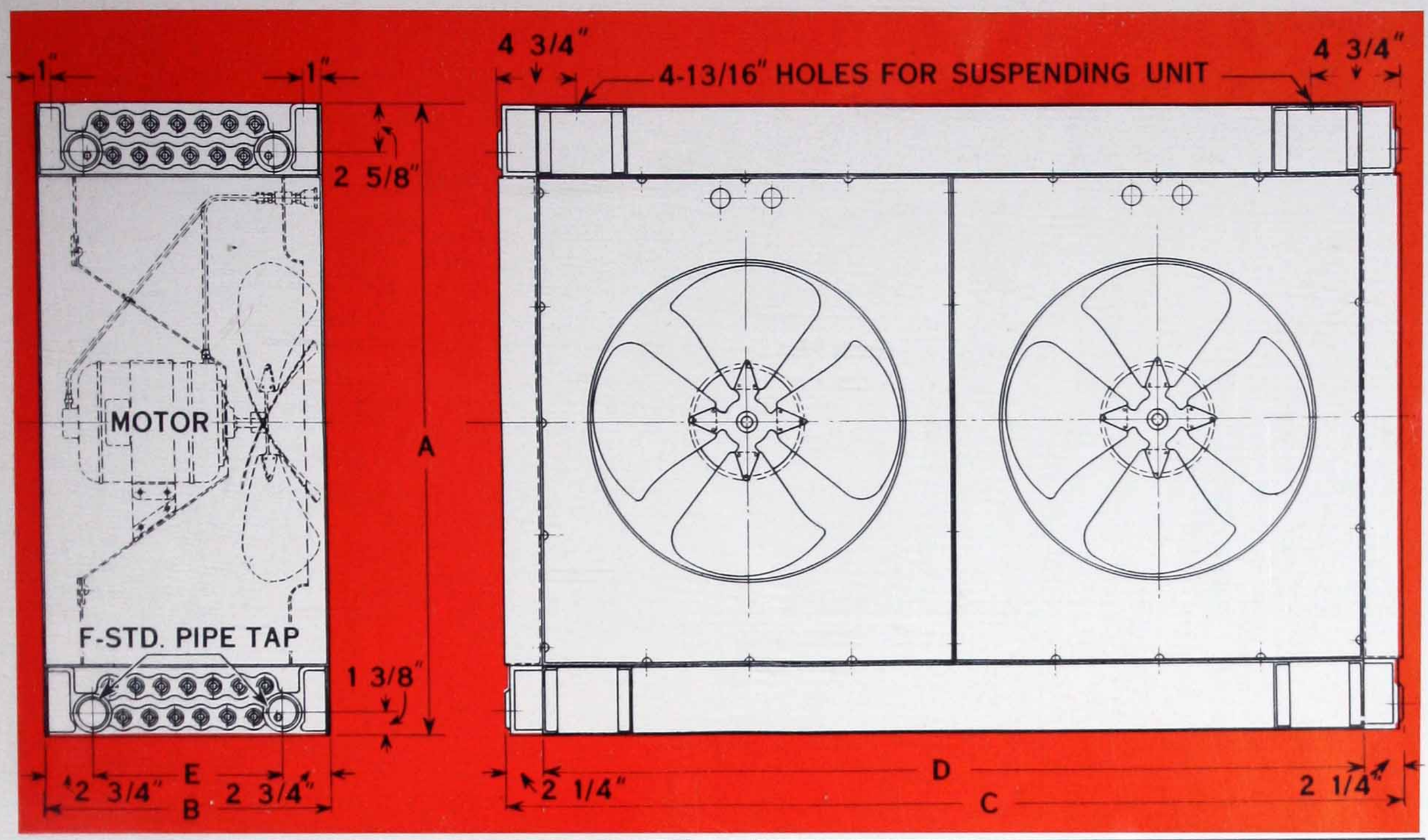
These are all standard pieces of equipment, but when interconnected through a relay switch (5), as indicated in the diagram, they make possible operating economies and heating comfort hitherto difficult to attain. Thermostats and steam valve are also indicated in the illustration on page 5.

When the floor thermostat (3) calls for heat, the steam valve (4) opens and the fans are turned on. As soon as floor temperature approaches the comfort point, steam is automatically turned off. Fans, however, continue to run until ceiling temperature drops to the predetermined point for which the thermostat at the ceiling is set.

Economy

Thus by simple adjustment of floor and ceiling thermostats, ceiling and floor temperatures are automatically equalized. Ceiling temperatures are lowered 10° to 25°. It is a simple mathematical problem to prove that these lowered temperatures result in fuel savings of 15% to 25%, and even more.

Trane Projection Heaters have made this simple, automatic system possible. The features are in the units; the system makes possible full utilization of them.



CAPACITIES

The table at the bottom of the page facilitates the calculation of capacities where steam pressure or temperature of air entering the unit are other than 2 pounds gauge, and 60°.

Note that unit 2-18P is available with either 1140 r.p.m. or 1725 r.p.m. motor. Be sure to specify motor speed when ordering.

UNIT No.	C. F. M.	CAPACITY 2 lbs. Steam 60° Entering Air		Final Temperature	MOTORS	
		B.T.U. Per Hour	E.D.R.		R.P.M.	No. Required and H.P.
2-18P	4810	350,000	1460	127	1150	2—⅙
	7260	450,000	1875	117	1725	2—½
2-20P	6880	500,000	2080	127	1150	2—⅓
2-22P	9110	660,000	2750	127	1150	2—½
3-22P	13,750	1,000,000	4165	127	1150	3—½

DIMENSIONS

Roughing-in dimensions for Trane Multiple Projection Heaters are approximate only. If exact dimensions are required, certified prints will be furnished on request.

Three-fan unit No. 3-22P is of the same basic construction shown for 2-fan units. The cross-section is identical, but the unit has one extra fan section.

UNIT No.	COIL SIZE (Inches)	FAN DIAMETER and No. Required	APPROXIMATE ROUGHING-IN DIMENSIONS (Inches)					
			A	B	C	D	E	F
2-18P	12x 48	2—18"	33	16½	52½	48	11	1¼
2-20P	12x 72	2—20¼"	33	16½	76½	72	11	1¼
2-22P	15x 72	2—22½"	36	19½	76½	72	14	1½
3-22P	15x108	3—22½"	36	19½	112½	108	14	1½

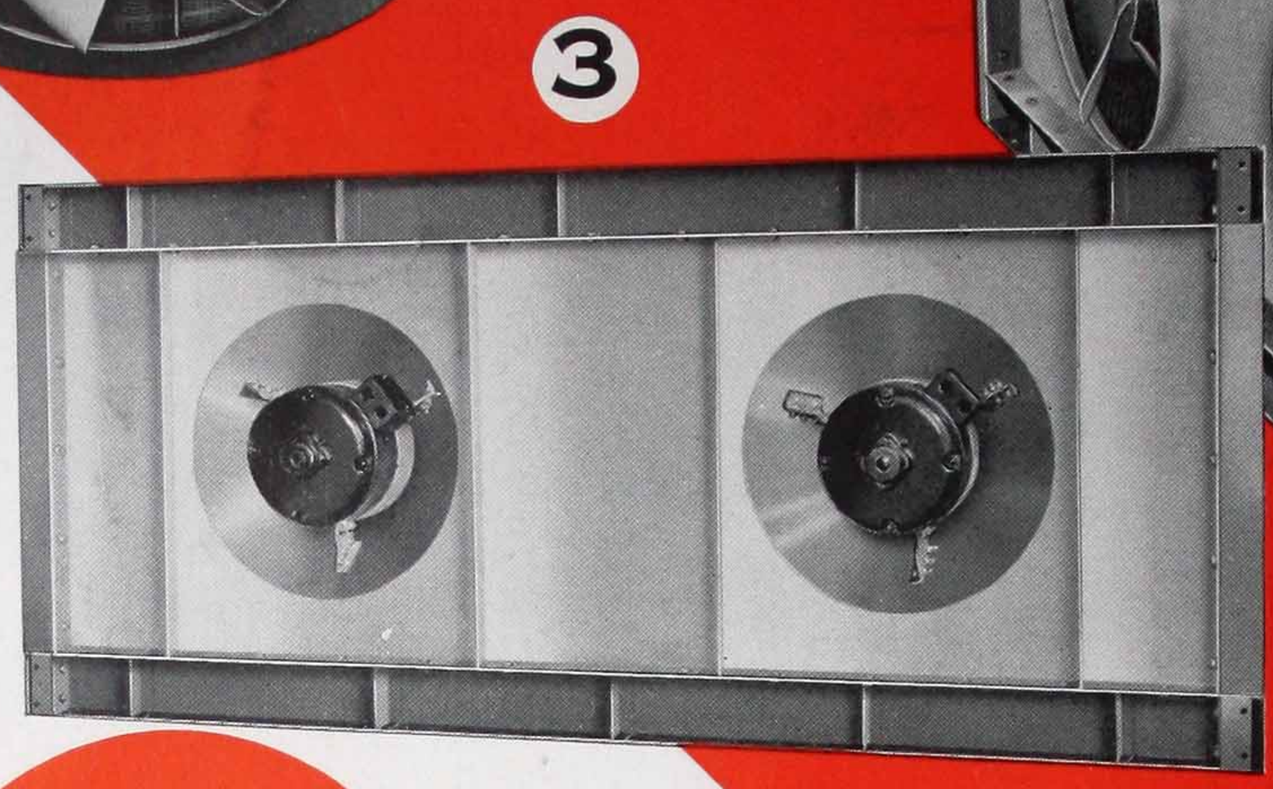
CONSTANTS FOR DETERMINING CAPACITY OF TRANE MULTIPLE PRODUCTION HEATERS FOR VARIOUS PRESSURES AND TEMPERATURES

Table Based on Steam at 2 lbs. Gauge and 60° Entering Air

Steam Pressure, lbs. per Sq. In. Gauge	TEMPERATURE OF AIR ENTERING HEATER																
	—10°	0°	10°	20°	30°	40°	45°	50°	55°	60°	65°	70°	75°	80°	85°	90°	100°
0	1.483	1.405	1.329	1.253	1.178	1.105	1.070	1.032	.997	.962	.926	.892	.858	.822	.788	.754	.688
2	1.520	1.442	1.363	1.290	1.215	1.141	1.105	1.069	1.035	1.000	.965	930	.895	.861	.825	.792	.728
5	1.565	1.485	1.410	1.334	1.260	1.187	1.150	1.114	1.080	1.045	1.010	.975	.940	.906	.872	.838	.771
10	1.637	1.558	1.480	1.403	1.328	1.253	1.219	1.182	1.148	1.112	1.078	1.042	1.008	.973	.938	.903	.838
20	1.728	1.649	1.572	1.498	1.421	1.350	1.313	1.278	1.243	1.208	1.172	1.138	1.104	1.070	1.035	1.002	.936
50	1 927	1.850	1.773	1.700	1.628	1.554	1.520	1.483	1.450	1.416	1.382	1.347	1.312	1.278	1.245	1.211	1.145
75	2.043	1.970	1.895	1.822	1.750	1.680	1.645	1.609	1.573	1.540	1.505	1.471	1.438	1.402	1.369	1.333	1.268
100	2.150	2.071	1.994	1.919	1.845	1.770	1.735	1.700	1.665	1.630	1.595	1.560	1.527	1.492	1.460	1.425	1.359

HOW TO DETERMINE SPECIAL CAPACITIES

GIVEN: Projection Heater with capacity of 500,000 B.t.u. at 2 lb. steam with 60° entering air. DESIRED: Capacity of this unit using 20 lb. steam and 40° entering air. SOLUTION: Under 40° and across from 20 lbs. in the Conversion Table we find factor 1.350. 500,000x1.350—675,000, which is the answer. If working in E.d.r., multiply E.d.r. by same factor in the same way. To change B.t.u. to E.d.r., divide B.t.u. by 240.

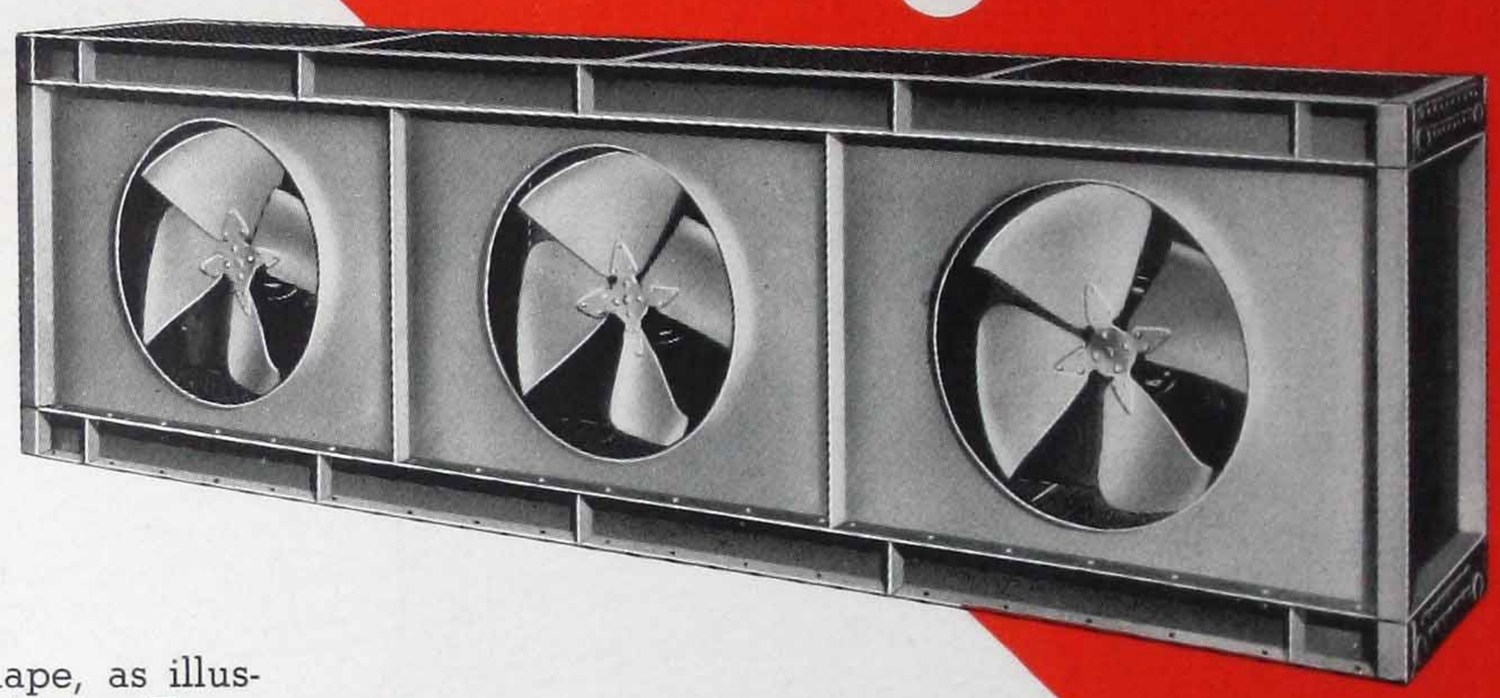


1. The circular coil, single fan, Trane Projection Heater. See Bulletin 284.

2. The 2-fan Multiple Projection Heater, tilted to show arrangement of fans and coils.

3. Rear view of 2-fan Unit. The 3-fan unit is of the same basic construction.

4. The 3-fan Multiple Projection Heater. It delivers 1,000,000 B.t.u.!



The Models

TRANE Projection Heaters are available in five 1-fan models, three 2-fan models, and one 3-fan model.

The 1-fan models are circular in shape, as illustrated above. They are completely described in Trane Bulletin 284.

The 2-fan and 3-fan construction is essentially the same. Note particularly in the rear view of the 2-fan unit how the motors ride on three-point vibration-absorbing mounting.

While the units are primarily designed for ceiling mounting, they are also available with floor stands or wall brackets if desired. Under normal conditions, Trane Free-flo Grilles or Trane Louvers should be specified for floor or wall mounting, to deflect heat to the floor.

If Multiple Projectors are ordered for floor mounting, desired distance between bottom of unit and floor should be specified. A simple, reinforced angle iron frame, of any height specified, will be furnished as an extra.

Any of the Multiple Projectors can be used for ventilation service by attaching short runs of fresh air duct to either or both of the Trane Extended Surface Coils. Since duct work changes the operating characteristics of any unit heater, Trane engineers should be consulted before making this type of installation.

THE
TRANE
COMPANY
La Crosse, Wisconsin, U.S.A.

The Trane Company manufactures a complete, Undivided Responsibility Line of Heating, Cooling and Air Conditioning Equipment. This equipment is made available through over 70 offices in the United States, as well as through connections in all foreign countries.

IN CANADA: Trane Company of Canada, Ltd. Mowat & King Sts., W.—Toronto—11 Branches

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